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MEASURING FARM LEVEL CREDIT USE:

A BRAZILIAN EXAMPLE

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During the past decade heavy emphasis has been placed on agricultural credit in less developed countries. The size of these lending activities along with various associated problems have increasingly attracted researchers' attention.[1/] A number of investigators around the world are collecting farm level data to answer credit questions. Still others are attempting to use lending or borrowing data assembled by financial institutions, farm records, and general farm management studies. A number of these credit studies have poorly specified measures of farm level loan use. The most serious problem is poor specification of the terms of the loans, both in the data collected and the research results. The vagueness of the credit measures makes it difficult to do comparisons across studies, and does not show the availability of credit at critical times during the production cycle. Both of these problems can be dealt with by more carefully documenting the cycle of credit use during the study period.

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1/ The very extensive review of small farmer credit programs carried out by the Agency of International Development during 1973 is an example of this interest.

Many researchers have recognized the need for having credit available at critical times during the production cycle. Farm level studies in LDC's have generally ignored this question of timing. In Brazil, for example, the production cycle for some crops is 4 months. Thus, it is critical that credit be available in two cycles during the year. A loan which has been partially liquidated by the start of the production year should be treated differently from one on which payments have not been made. Similarly, a loan received at the end of the year should be handled differently from one outstanding during the entire year. Commonly, data on production credit is lumped together into one measure: whether it was available before the first production period, before the second production period, or at the end of the production cycle. Thus, the measure of credit is not sensitive to its acutal availability during the production process.

In the discussion which follows we specify and evaluate some of the commonly employed farm-level loan-use measures. We then present an additional measure which may be useful for certain types of analyses. These various measures are then applied to Brazilian farm-level data. The analysis shows that the measures selected substantially affects the interpretation of loan use information.[2/]

2/ This study was carried out in 1971 among 150 farmers located in a depressed region in the State of Sao Paulo, Brazil. Further details on this study can be found in Gerald I. Nehman, "Small Farmer Credit Use in a Depressed Community of Sao Paulo, Brazil," unpublished Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, The Ohio State University, 1973.

Common Credit Measures

Farm level credit studies often pursue a number of different economic objectives. It is not surprising, therefore, that several measures of credit use have been used to serve these objectives. The following measures are the ones most commonly found in credit-use studies:

(1) The contractual value is the total amount of principal received by a borrower. It is the most common measure of farmer's credit.

(2) The sum of loans in force is the debt outstanding during the study period. It includes the outstanding balance on loans received prior to the study year plus all loans received during the study year.

(3) The beginning year balance measures the sum of loans in force at a point in the production cycle when inputs are being purchased and the land is being prepared and planted.

(4) The ending year balance measures the sum of loans in force at the end of the production cycle when cash from the sale of crops is available to liquidate debts.

An alternative credit measure being proposed in this paper includes an adjustment factor to reduce the sum of loans in force to a monthly equivalent basis. It is defined as follows:

(5) Credit availability measures the usefulness of credit on a monthly basis. To calculate credit availability, loans in force for the entire year are recorded at face value; loans in force for one half of the year are recorded at 50 percent of face value, etc. Credit availability was calculated as follows:

$$\text{Credit availability} = \text{Outstanding balance in 1970/71} \times \text{Number of months loan was in force, 1970/71} \times \frac{1}{12}$$

Comparative Analysis of the Various Credit Measures

In pursuing different research objectives farm level credit studies should use those measures of credit which best serve the research objectives The purpose of this section will be to discuss the advantages and disadvantages of the various measures. The following measurement problems will be emphasized. First, much of the farm level credit data is not temporally defined. Nevertheless, since it is available, it is often used in various credit studies. Second, the alternative credit measures which we have listed are not measuring the same thing and will lead researchers to different conclusions. Third, the sources, distribution and uses of credit shown by the data will differ depending on the credit measure selected. The following discussion will demonstrate these measurement problems using farm level data from Brazil.[3/]

Temporal Definition

The beginning and ending year balance both measure the amount of credit in use at particularly critical times during the production year. They provide a temporally pure picture of the credit situation at these two points. If this kind of data were available monthly, it would provide important information on short term credit constraints to farmers decision-making. However, given only these two points in time it does not show the extent to which the money was actually available for use during the year. Often, the farmer is in a strong cash position at the end of the year and

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3/ The data is from G.I. Nehman, op. cit.

liquidates his production loans. He may also have the leverage to negotiate a purchase of machinery which would increase his debt load disproportionately. In both cases, the data are highly dependent on the timing of the interview, whether just before the harvest, during the fallow period, or just prior to planting.

As can be seen in Table 1, based on the credit held by 86 farmers during the 1970/71 agricultural year, the beginning balance for all farms was around Cr$239,200. This was about 45 percent of the value of loans received during the year. The ending balance for all farms was around Cr$347,200. This was about 65 percent of the total value of loans received during the year. Thus, both of these measures, though temporally pure (i.e., representing points in time during the year) substantially understated the volume of credit available to the farmers during the year.

These are generally the only specific points in time for which we have data. If we use these measures, however, we are understating on the order of 50 percent of the amount of credit that has been received during the year.

Measures of Credit Volume

The contractual value and the sum of loans in force are both measures based on the face value of the loan contract. These are the most commonly used measures of credit volume. The major disadvantage of these measures is that one may be summing loans with widely different repayment periods. It is for this reason that measures such as contractual value and sum of loans in force have limited application in economic analysis. The following example illustrates the problem. A borrower with 12 consecutuve 1-month loans of $100 each has a total contractual loan value of $1200 for a 12-month period. A borrower with one loan for $100 with a term of 1 year has a total contractual loan value of only $100. The economic impact

TABLE 1

VARIOUS MEASURES OF LOANS OUTSTANDING DURING THE 1970 to 1971 AGRICULTURAL YEAR BY SOURCE OF LOAN FOR THE SAMPLE OF 86 BORROWERS IN SAO PAULO

Type of Loan	Number of Farms	Loans Outstanding During Production Year									
		Contractual Value [a] (Cr$) [c]	(%)	Year Beginning Balance (Cr$)	(%)	Use of Loans in Force [b] (Cr$)	(%)	Year End Balance (Cr$)	(%)	Loans Received During 1970/71 (Cr$)	(%)	Credit Availability [e] (Cr$)	(%)
Formal Cash Loans	43	454,100	83	212,700	89	445,100	83	277,800	80	373,600	82	397,700	84
Informal Loans													
Non-Bank Cash Loans	22	16,300	3	3,100	1	16,800	3	8,800	3	11,900	3	19,800	3
Time Purchases	32	74,200	14	23,000	10	74,600	14	60,600	17	68,800	15	51,900	11
Total Informal [d]	52	91,000	17	26,500	11	91,400	17	69,400	20	80,700	18	71,700	15
Total All Loans [d]	86	545,100	100	239,200	100	537,100	100	347,200	100	454,300	100	469,400	100

[a] Includes loans contracted prior to the 1970-71 cropping year.
[b] Excludes portion of loans liquidated prior to September, 1970.
[c] One Cr$ (Cruzeiro) was equal to $0.20 (U.S.).
[d] Does not equal sum of the above because some farms had more than one type of loan.
[e] (Sum of Loans in Force) x (Months During Year Loan was in Force) (1/12).

Source: Farm Interview data reported in Nehman, G.I., "Small Farmer Credit Use in a Depressed Community of Sao Paulo, Brazil," Ph.D. Dissertation, The Ohio State University (1973).

of their loan would be essentially the same, however. In this study, contractual value and the sum of loans in force are almost the same amounts (Cr$546,100 and Cr$537,100, respectively). This is because payments had been made on only 2 percent of the long term credit carried over from previous years. In fact, 84 percent of the credit farmers held in 1970/71 was received during the year. This is shown by the ratio of loans received over loans in force (Table 1).

As measures of credit volume, contractual value, sum of loans in force, and loans received overstate the availability of credit because many of the loans were short term.

Credit Availability

To calculate credit availability, the data must include the months the loans were in force during the study year. This can be based on the dates the loans were negotiated and liquidated or on the terms of the loan. Using this information, we reduced the value of loans if they were only available for part of the year (see formula above). Thus, a loan available for 6 months was assumed to be half as usable and half as valuable as one available for the entire year.

Using the Brazilian data, the measure of credit availability which takes the term of loan into account, was valued at Cr$379,400. This is about 84 percent of the value of loans received during the year. This calculation shows that the farmers had 16 percent less use from their credit portfolios than they would have had if all terms were for the entire production year. It is felt that this figure is a more realistic measure of credit volume than the time specific measures (i.e. beginning and ending year balance).

Comparative Analysis

By examining credit by source, 83 percent of the contractual value was from formal credit sources. This includes the balance on loans negotiated prior to 1971, but carried over into the study period. Loans from non-bank sources were 3 percent of the contractual value. If beginning period balance was used, only one percent of credit was from non-banks. Also, the total informal credit used was 6 percent lower using the beginning period balance rather than the contractual value.

A measure which weights informal credit heaviest is the end of period balance. This measure attributes 20 percent of total loan value to informal sources. In value terms the farmers had Cr$69,400 available at end of year from informal sources but only Cr$26,500 available at beginning of year. Eighty nine percent of credit availability was from formal sources. This relatively high percentage indicates that formal loans have longer terms than informal loans. One reason for this is that time purchases are negotiated when inputs are purchased. Cash loans, however, are negotiated prior to the purchase so as to be available on the purchase date. The result is that credit availability of time purchases is low (8 percent) relative to all the other measures (ranging from 10-17 percent).

The above discussion does not lead to the conclusion that one credit measure is better than the other. We only point out first, that each of the measures has a major limitation in that it gives no indication of how available the credit is; and second, the choice of measures can skew the distribution of credit, depending on what the research is trying to show.

The measure of credit availability herein proposed does not deal with the second question. However, it is a measure that reduces all loans to a common denominator so that they can be compared as a flow of borrowed funds during the year.

Summary and Conclusions

The most commonly used measure of volume of agricultural credit is the contractual value of loans. This measure is often adjusted by subtracting payments made prior to the beginning of the year. However, it still does not show the funds available to a farmer during a particular production year. For example, funds received at the end of the production year are included in the contractual value even though they are not available for use during the year (i.e., inputs purchased with the money are for the next production year).

To avoid this and other related measurement problems, we have suggested that a simple adjustment be made to the contractual value of a loan. This adjustment weights the contractual value for the time period available. A loan available for one half year was weighted by 6/12; for three months 3/12, etc.

When this weighting was done for farm level data in Brazil, it was found that the most flexible credit source, namely time purchases, had the lowest level of availability. This was interpreted to indicate that credit from less flexible sources, such as banks, was in the hands of the farmer for longer than he required to satisfy his credit needs during the production cycle.